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(19)

(54) FLUID FLOW CONTROL VALVE

(71) We, HONEYWELL GESELLSCHAFT MIT BESCHRAENKTER HAFTUNG, a German Company of D-600 Frankfurt am Main, West Germany, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fluid flow control valves.

According to the invention, there is provided a fluid flow control valve comprising a valve body, a flexible annular member located within the body and defining a valve seat, a valve closure member movable into sealing engagement with the valve seat, the valve closure member being rotatable about an axis offset from the central axis of the valve seat so that rotation of the closure member in a valve closing direction will bring the closure member into a position facing and engaging the valve seat, and a support ring for limiting the axial deflection of the valve seat during sealing engagement of the seat and closure member thereby also limiting the rotational movement of the closure member, and wherein openings are provided to enable the fluid to enter a space between the flexible member and support ring so as to increase the sealing pressure between the valve seat and closure member in the closed condition of the valve.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings, in which:—

Figure 1 is a longitudinal section through a fluid flow control valve according to the invention, and

Figure 2 is a transverse section through the valve of Figure 1.

Referring to the drawings, the fluid flow control valve includes a valve body 1 in which a closure member 2 is rotatably mounted by means of an axle 3 extending transversely to the direction of fluid flow through the body. The closure member is movable into sealing engagement with a lip 17 of a flexible annular diaphragm 16, the lip providing a valve seat. The closure member consists of a part-spherical head portion 4 disposed at one end of two elongate arm portions 5, the other end of the arms defining two collar portions 6 enabling the closure member to be mounted on the axle, the closure member being fixed for rotation with the axle by at least one key 7. The longitudinal axis of the head portion 4, 5 is aligned with the central axis A of the valve seat and is offset from the axis of axle 3 by a distance *X*. The axle 3 is supported at one end in a blind hole 8 provided in the body 1 and at the other end in a bearing bushing 9. The bushing includes a ring gasket 10 to prevent fluid leakage between the valve housing and the axle 3. Secured by a key 12 to a portion of the axle 3 projecting from the body 1 is a link 11 which, in conjunction with an actuator such as a pneumatic piston and cylinder unit (not shown), is employed to control the position of the closure member with the valve body and hence to control the flow of fluid through the valve.

Threaded into one end of the valve body is a support ring 13, and clamped between the ring and an annular seat 15 on the body 1 is a rim 14 of the flexible annular diaphragm 16. The diaphragm is cup-shaped in longitudinal cross-section and at its inner periphery has two axial lips 17 and 18 extending in opposite directions. The lip 17 faces the head portion of the closure member and provides a valve seat therefor, the valve seating surface being smooth and shaped to conform to the part spherical surface of head portion. The lip

18 of height Y is disposed adjacent a stop surface 19 of the support ring, the stop surface acting to limit the axial deflection of the diaphragm (and hence the valve seat or lip 17) during sealing engagement of the valve seat and the closure member.

Openings are provided to enable the fluid to enter the space between the diaphragm and the support ring so as to increase the sealing pressure between the valve seat and closure member in the closed condition of the valve. These openings may be provided by bores 20 formed in the ring 13 or by a series of circumferentialy spaced gaps formed in the lip 18 which would be of castellated or toothed form.

The inner diameter 'd' of the ring 13 is less than the inner diameter 'D' of the lips 17 and 18 in order to reduce the effect of erosion on the valve seat.

During rotation of the closure member from its valve open position (shown dotted) to its valve closed position (shown in full lines), the part-spherical surface of the head 4 is brought into facing and engaging relationship with the valve seat of the diaphragm 16 causing deflection of the valve seat and diaphragm from their position (shown dotted) and effecting a seal-tight closure of the valve, axial deflection of the diaphragm and valve seat being limited by surface 19.

In the closed condition of the valve, fluid from the inlet (as defined by the lower end of the valve body as viewed in Figure 1) is able to enter the space between the diaphragm and the support ring through the openings 20 or through the openings between the teeth of the lip 18, so as to increase the sealing pressure between the valve seat and closure member.

WHAT WE CLAIM IS:—

1. A fluid flow control valve comprising a valve body, a flexible annular member located within the body and defining a valve seat, a valve closure member movable into sealing engagement with the valve seat, the valve closure member being rotatable about an axis offset from the central axis of the valve seat so that rotation of the closure member in a valve closing direction will bring the closure member into a position facing and engaging the valve seat, and a support ring for limiting the axial deflection of the valve seat during sealing engagement of the seat and closure member thereby also limiting the rotational movement of the closure member, and wherein openings are provided to enable the fluid to enter a space between the flexible member and support ring so as to increase the sealing pressure between the valve seat and closure member in the closed condition of the valve.

2. A valve according to claim 1, wherein the inner periphery of the flexible member has two axial lips extending in opposite directions, one lip defining said valve seat and the other being engageable with the support ring.

3. A valve according to claim 1 or 2 wherein the openings are formed in the support ring.

4. A valve according to claim 2, wherein said other lip is of toothed or castellated form to provide a series of circumferentially spaced openings.

5. A fluid flow control valve substantially as herein described with reference to and as illustrated in, the accompanying drawings.

For the Applicants,
JOHN RIDDLE.

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2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

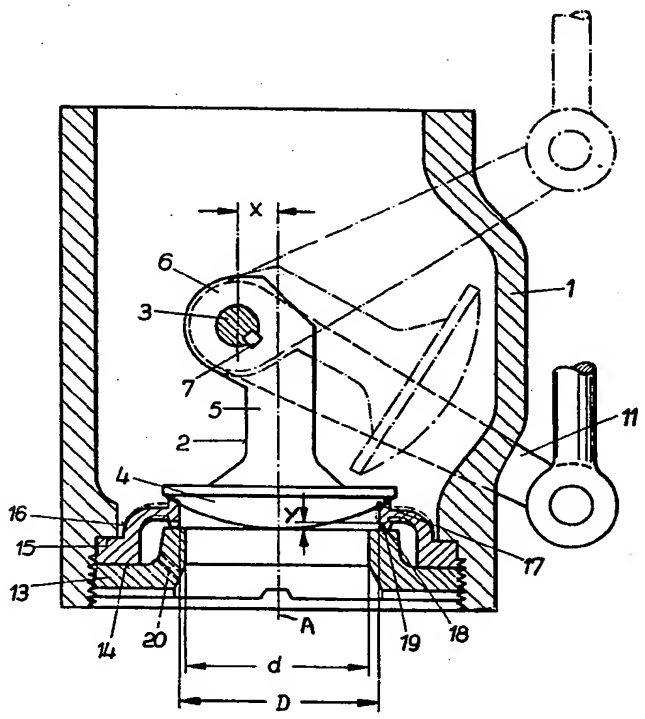

Fig. 1

1443887 COMPLETE SPECIFICATION
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Sheet 2

Fig. 2